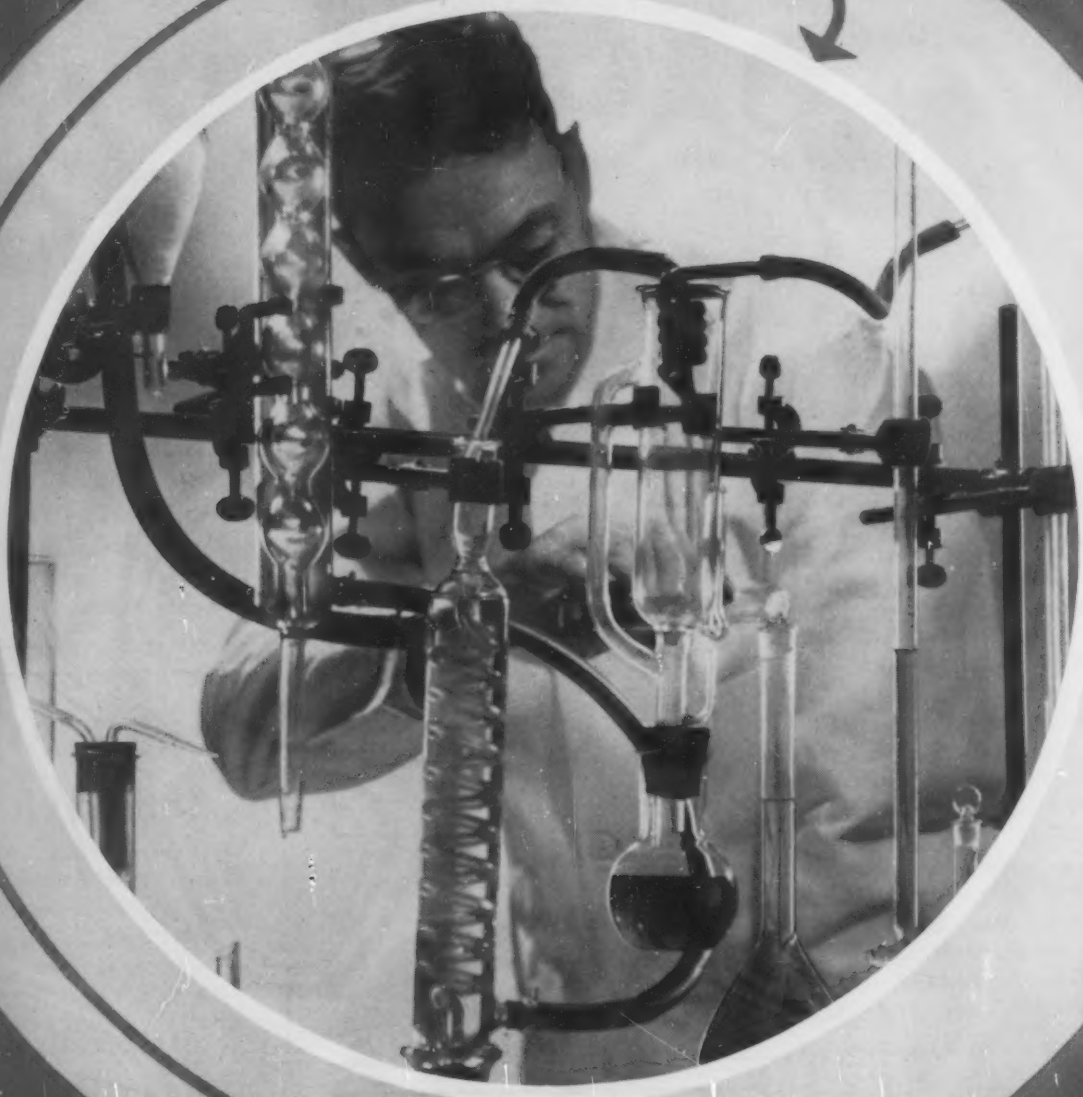
THE INSTITUTE SPOKESMAN



PUBLISHED BY THE
NATIONAL LUBRICATING GREASE INSTITUTE

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Index to "The Institute Spokesman"

The issues of "The Institute Spokesman" over the ten years it has been published contain a large number of very good technical articles on lubricating greases. We are always complimented and impressed with the importance that is attached to keeping a complete file of "The Institute Spokesman" by individuals, institutional, technical, and college libraries. Frequently we are asked for copies of back issues and in the event they are not available, for photostatic copies.

The opinion has been expressed that lacking an index of these articles, it is necessary for anyone searching for a particular subject to read through every issue until they find what they want. In this issue of "The Institute Spokesman" we are correcting that situation and a complete index of all past issues of "The Institute Spokesman" from the first one published in March of 1937 up to and including March of 1946 is made a part of this issue.

It is alphabetized by the author's name and gives you in addition to the title of the article, the month, year, volume, and number of its appearance. For your convenience the index has been placed in the center of "The Institute Spokesman." By opening the wire staples that bind the issue you can, if you wish, remove the index, re-staple and file it separately. There is no advertising on the pages of the index.

From now on in the March issue of each year we will print a similar index of the complete volume. The index appearing in the March, 1947, issue will cover Volume Ten; April, 1946, to and including March, 1947.

The INSTITUTE SPOKESMAN

Published monthly by

THE NATIONAL LUBRICATING GREASE INSTITUTE

CARL E. BOLTE ..... *Editor*

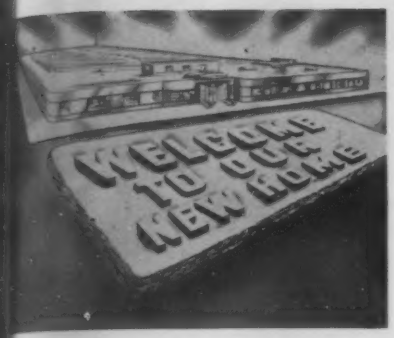
Land Bank Bldg. K. C. 6, Mo.

Again, We Welcome New Members . . .

To the Associate Membership list has recently been added the Stratford Engineering Company, 1414 Dierks Building, Kansas City, Missouri. This compa devotes itself exclusively to the develo ments of new processes, designing m chinery and equipment for the oil indu try. Their work includes the engineeri of a complete lubricating grease instal tion and they are at the present ti doing considerable pilot plant wo where exhaustive tests and time studi are being made. A genuine and cord welcome to Institute membership is e tended to this fine firm.

A change in membership status worthy of proper recognition. When t Deep Rock Oil Corporation, P. Box 725, Chicago, Illinois, became manufacturer of lubricating greases th were then eligible to become Acti Members in the Institute. For a numb of years the Deep Rock Oil Corporati had been an Associate Member, but th Board of Directors at their July meetin in Hershey, Pennsylvania, approved th change from Associate to Active Mem bership which has been effected an therefore, a word of welcome is due th Deep Rock Oil Corporation as they be come Active Members of the Institute.

TESTING ★ TOPICS ★



MR. SIDNEY BEVIN RETIRES . . .

Retiring director Sydney Bevin of Fiske Bros. Refining Co., Newark, and Geo. E. Merkle of the same company who succeded him discuss the Institute's progress with Carter W. Hazzard and Walter Duncan of the Alemite Division, Stewart-Warner Corp.

Speaking to the Board of Directors of the National Lubricating Grease Institute at their meeting in Chicago on September the 30th, 1946, Mr. Sydney Bevin indicated that because of his retirement from active business with the Fiske Bros. Refining Co., Newark, N. J., he felt it necessary to tender his resignation as a member of the Board of Directors of the Institute to be effective immediately. In speaking to the Board concerning his resignation, Mr. Bevin said: "It is with real regret that I offer my resignation. I have seen this Institute grow from a very humble beginning to its present position of influence in the lubricating Grease industry and of importance and great value internationally. My association with the members of this Board and the members of the Institute have been most pleasant. I shall miss them greatly and regret the necessity of this break in their continuity." On behalf of the Board of Directors and the membership President Carl W. Georgi of the Enterprise Oil Co., Buffalo, New York, expressed the appreciation for the many years of valuable service Mr. Bevin had rendered to the Institute, giving unselfishly of time and talent for a number of years.

In deference to Mr. Bevin's wishes the Board accepted with regret his resignation and elected Mr. Geo. E. Merkle, Vice-President and General Manager of Fiske Bros. Refining Co., to fill out Mr. Bevin's unexpired term of one year on the Board.

The War and Post War

GREASE INDUSTRY *in England . . .*

COL. S. J. M. AULD

● This paper was delivered before the 14th Annual N.L.G.I. Convention, Chicago, Ill., Sept. 30, 1946

Grease-making is quite rapidly coming into the domain of science and chemical engineering and out of the realm of "artfulness" in which it has so long rested. This, fortunately, has been particularly the case since the immediately pre-war period, for it has enabled grease makers to maintain a high standard of lubricating performance under difficult conditions of raw material supply. At the same time, however, performance demands have become consistently more rigorous, so that the necessary adjustments and substitutions in formulation have been far from simple.

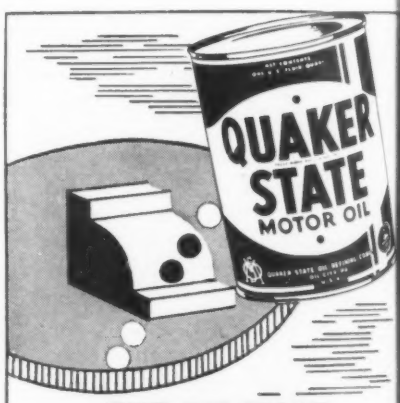
The manner in which war-time "austerity" conditions have been and are continuing to be met in the United Kingdom may prove of interest to others who find themselves in a similar position as regards supplies. The chief difficulty is, of course, limitation of fatty material, supplies of which are now everywhere much shorter even than during hostilities. That is a world-wide condition and, like everyone else, you are suffering from it in America. In some ways it is a more serious matter than the war-time scarcity, for it is tied up with world food-shortage and we are therefore uncertain how long it will last. It is no longer possible to differentiate easily between edible and non-edible fats, since the former can be made by hydrogenation. Moreover, in times of stress, much is eaten which would normally be available for other purposes. Based largely on the prospects of the main oil crops, it has been suggested that fat shortage may continue at least for another year or eighteen months.

In the U. K. during war-time there was a great diversion of glycerides to food and to the manufacture of soap and glycerine, leaving only limited supplies of tallow, ground-nut oil and palm oil, but with good supplies of "acid oils," i.e., the by-product of oil splitting, and of sewage grease. The last-named is peculiarly a British product. It is derived from the sewage effluent of the Bradford "woollen" district and contains high

Col. S. J. M. Auld, Chief Technologist Socony-Vacuum Oil Co., Ltd., Chairman Grease Sub-Committee, Institute of Petroleum, London, England.

proportions of wool grease derivatives as well as regular fatty acids derived from soaps used in scouring, together with some mineral oil. It is a dark brown unctuous material resembling low grade wool grease and possessing a distinctive and unpleasant odor. The saponification value is of the order of 130 and the free fatty acid content about 25%. It is easily converted into soda or lime base greases, but both have poor resistance to churning. It finds its best use as raw material for the distillation of wool grease "stearines" which are extremely valuable adjuncts to grease-making.

The net result is the enforced use of fatty acids and acid oils in place of bone grease and similar glycerides. This necessitates changed technique which in the case of the author's company was complicated by the complete destruction of the plant and its rebuilding elsewhere in make-do fashion. At one time it looked as if grease production might prove a bottleneck in war production for the other largest grease works of the country was also bombed a week or



...ter. The situation was met, however, ... mutual cooperation and general stim... of production. Priority was given ... rebuilding the destroyed works and ... significant of the good spirit which ...evail: that another company spontan...ously and immediately handed over their ...serve scraped kettle to help.

The war-time fatty acids were mostly ...ther autoclave or Twitchell split. The ...id oils were around 60% F.F.A. con...nt. It was found advantageous to ...ake a mixed stock of all three so that ...mporary variations in supply would ...ve the minimum effect. This gives ...bout 10% glycerides and is around the ...aximum which does not necessitate ...ressure or prolonged saponification.

There are two major difficulties at...ched to all this. The first is the prac...al elimination of glycerine. The second ... the mainly vegetable origin of both ...tty acids and acid oils. This results in ...sic reduction in stearic acid content ...nd increase in the proportion of unsat...rated acids.

Cup Greases

The effect of such conditions on cup ...reases is marked. The colloidal structure tends to a more highly emulsoid type, with the result that softer greases are usually produced. These greases are good enough lubricants, but judged by their soap-content penetration factor they are less economical to produce. Depending on the type of fatty acids used, the increase in soap content to give the same consistence may be anything from 10% to 30% over corresponding glyceride figures.

A much more serious drawback to cup greases made in this way is a reduction in consistency on standing. No oil-separation or visual change in structure appears, but the greases lose consistency—from 30 to 50 points, generally within a month or so, thereafter showing no change. This was of particular and direct importance during hostilities for two reasons. Firstly, as much grease as possible had to be held in dispersed Government stores and in makers' reserve stocks, so as to make the supply position less vulnerable to air attack.

In the second place it is the custom, because of the requirements of one of our biggest makers of anti-friction bearings, to use soft chassis-grease of the lime base type in the wheel bearings of many of our motor vehicles. Where such greases tend to soften in storage the difference in penetration may be sufficient to accentuate leakage onto brakes and cause serious trouble.

The cause of this softening in storage is obscure and in practice for a while had to be offset as far as possible by making the grease initially to stiffer consistency.

The clue to the change probably lies in the fact that soaps in the gel condition are of higher viscosity than those in the paste condition. Greases containing matastable soap gels tend therefore to revert on ageing. The effect is magnified by the absence of natural glycerine and by the presence of low-molecular weight acids in the vegetable fatty acids. It was also significant that the grease-makers tended to cut down the amount of stabilizing water in fatty acid greases. This was perhaps understandable because it gives more transparent and attractive products but it emphasizes the trouble. Recent reintroduction of glycerine and the use of increased quantities of finishing water has made it possible to make fatty acid greases stable in storage as well as satisfactory in use.

Soda-Base Greases

The basic requirements of soda-base ball and roller bearing greases are stability towards heat and resistance to mechanical breakdown. These requirements are best attained by rendering the grease as fully suspensoid in character as possible and avoiding the gel or micelle structure, which is related to fibre growth and higher viscosity.

Modern soda-base and roller bearing greases are preferably made from hydrogenated fatty materials. These produce unctuous and smoother products than in the past. They have only minimum visible structure and show good

Continued on Page 8

H. P. Hobart, N.L.G.I. President, To Chairmanship of A.P.I. Lubrication Committee

In a brief period of a few months two outstanding honors have come to Mr. H. P. Hobart, the Presidency of the National Lubricating Grease Institute and the Chairmanship of the A. P. I. Lubrication Committee. These important assignments are in recognition of long service by Gulf Oil Corporation's General Manager of Lubricating Sales to these organizations, the industry as a whole and other technical units on lubrication. Mr. Hobart has been a member of the A. P. I. Lubrication Committee for a number of years and has served as its Vice-President, he represents the A. P. I. on the Committee of Lubricants of the American Society of Testing Materials. He is a Trustee of the National Petroleum Association.

A native of Cleveland, where he was born in 1888, Mr. Hobart studied at Cleveland's University School for seven years and at the Chase School of Applied Science for one year. He finished with three years at Yale University's Sheffield Scientific School and received a degree of Ph.B. in Mechanical Engineering in 1910. He was with the Cleveland Electric Aluminating Company, The Otis Steel Company, Cleveland, and the MacIntosh-Hemphill Company, Pittsburgh, before joining Gulf on May the first, 1919, immediately after discharge from the Army's Ordinance Department which took him to France in World War I.

Mr. H. P. Hobart, President N.L.G.I. and chairman of A.P.I. Lubrication Committee.

Mr. Hobart has introduced and merchandised Gulfpride and Gulflube motor oils and worked to develop Gulf's automotive and industrial lubrication business. He has worked closely with Gulf's Research Division to improve present products and develop new ones.

Mr. Hobart succeeds Mr. L. C. Welch, Standard Oil Company (Indiana), long a Director of N.L.G.I. Mr. M. B. Chittick, Pure Oil Company, one of the early members of N.L.G.I. and active in its organization and development was elected Vice-Chairman of the Committee.

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War and Post War Grease Industry in England

Continued from Page 5

thermal stability and resistance to churning. When such fats are withdrawn for food production, a number of difficulties arise. Combinations or special tallows and stearic acid or even the latter alone are helpful but not always available. When one is forced to mix fatty acids and acid oils, it is of first importance to avoid unsaturated fats. Not only do these make softer greases but their crystallizing temperatures are low. This results in undesirable stiffening in the grease when exposed to even moderate temperatures for relatively short periods so that objectionable fibre growth in use eventuates. In manufacture, too, such products take longer to mill down in the kettle and tend to revert to the fibrous condition when reheated. Experience suggests that fat blends for ball and roller bearing greases should have iodine values lower than 20 (Wijs). This at times proved and is still proving a major supply difficulty.

Anything tending to render the grease more suspensoid in character is useful in discounting the effect of unsaturation. The free acids generally make better greases than the fats since glycerine and similar bodies appear to encourage fibre growth without adding to thermal stability.

To an appreciable extent, also, unsaturation may be offset by increasing the paraffinicity of the mineral oil.

Heat-Stable Lime Base Greases

Great Britain has always been fortunate in having at its disposal for grease-making the solid distillate from wool grease known as wool grease stearine, to which reference has already been made. This consists of a mixture of acids and unsaponifiable matter and is marketed in two qualities, "pale" and "dark." The latter is the more useful for grease manufacture. These stearines have the valuable property that their calcium soaps do not separate from mineral oils at temperatures above 100°C as do those of the regular fatty acids. The result is that they confer unique heat and pressure stability upon both lime and soda base greases.

As the war advanced the supply of these products decreased owing to the smaller quantity of wool being washed, while at the same time demand greatly increased by reason of the large requirements of the services for heat stable greases, and for the vast quantities of the special compound used to protect vehicle working parts from water during the invasion. As a result the content of the special acids decreased and therewith a corresponding decrease in the distillates' grease-making qualities. Average tests were:

	Normal		Austerity	
	Pale	Dark	Pale	Dark
Free acids (as oleic)	80	50	65	45
Melting Point, °F.	112	135	100	120

To meet this acute position service specifications were subdivided into categories of higher and lower thermal stability, whilst inclusion was permitted in the latter of free fatty acid up to 0.5% and/or of some special metallic stearates. These dispensations resulted in improved grease though not up to previous quality. Investigations arising from the situation showed, however, that heat stabilization can be secured by the use of certain other additives, the inclusion of which in quite small quantities produces stable greases which are satisfactory in storage and use.

Present Raw Material Supplies

Due, of course, to the general world shortage, fat supplies for grease-making are now worse, both qualitatively and quantitatively, than at any time during the war. All the stocks listed are severely limited and the only ones freed for export grades from the United Kingdom are "Bradford Grease" and/or "Yorkshire Stearines;" in other words, sewage grease and wool grease distillates.

It is manifestly impossible to produce lubricants of any quality from such limited ingredients, since the distilled acids, though an invaluable adjunct, are of little use except in conjunction with conventional fatty acids. Thus a cup grease using 20% of dark wool grease [illegible] has a worked penetration of 35[illegible] 28% sewage grease soap is requi[illegible] the same consistency. Twenty p[illegible] of normal fat or fatty acid on th[illegible] hand gives a consistency under 25[illegible] base greases made with only the emergenc[illegible] ingredients are completely unst[illegible] continued churning and are redu[illegible] liquids in one hour's churning or in [illegible] extended working test. All this is un[illegible] fortunate from the aspect of trade ba[illegible] ance, for Britain depends on export [illegible] manufactured foods to square her budget [illegible] and in the past export of lubricati[illegible] grease has been appreciable.

Another difficulty causing continu[illegible] formula adjustment is the renewed scar[illegible] city of glycerine and the glycols whic[illegible] might have been used in balancing th[illegible] lack of raw materials of special types, [illegible] described previously.

Conclusions Respecting Raw Materials

The most important general conclu[illegible] sions which may be drawn from th[illegible] foregoing are that lubricating greas[illegible] may be satisfactorily made from ver[illegible] restricted supplies of fatty stocks pro[illegible] vided the maker has (a) a clear idea o[illegible]

hat is required; and (b) fundamental cientific principles on which to work.

There is little doubt, in the first connection, that performance standards can e described which will guide grease esign towards desirable operational beaviour. As regards the second, it is the riter's belief that the greate t advances n grease-making technique will continue o be made through more scientific consideration of the physico-chemical, and n particular the rheological, or flow roperties of both raw materials and inished lubricants.

pecial Greases

(a) Lead Base Grease

One of the most consistently important lubricating greases with which the author was concerned was the mixed lime-lead base product required, amongst other things for the large tapered roller bearings of the British steel mills. Pumpability over long distances, high load-carrying capacity, thermal stability are essential, and in addition carefully limited emulsibility with water. Variation in composition, consistency and behaviour had to be reduced to a minimum, and this was not easy. Some two to three thousand tons of this grease were made in the rebuilt emergency plant referred to. There was no royal road to this achievement, and the results were obtained chiefly by laborious attention to selection of raw material, manufacturing control and testing. Shortage of staff was the chief difficulty and in this connection much might be said in praise of the adaptability and assiduity under hazardous conditions of the practical grease makers.

(b) Lithium Base Grease

An interesting case of "make-do" on an extensive scale was the manufacture of lithium base grease. Whatever its future, lithium grease was highly important during the war as a wide temperature-range aircraft lubricant. It was so important that the British Government decided a substantial proportion of the R.A.F. requirements must be made in the United Kingdom because of the vulnerability of shipping.

Alternative possible producers were occupied to capacity with other emergency requirements, and it fell to the lot of the author's company to be fully responsible. This involved working out procedure, designing and erecting make-do plant and coming into full production within a few months. Some points arising out of this emergency sequence are of interest.

Preliminary work showed that manufacture could not be carried out by lithia saponification *in situ*. The hydroxide available was the monohydrate LiOH.H2O which is unstable in its water content and carbonates rapidly. It was necessary, therefore, to arrange for production of lithium stearate to close specification of water content, free base, etc., and this was satisfactorily accomplished. The oil was a special Colombian 70″ distillate, refined in the United Kingdom, and having a Pour Point of —65° F.

Manufacturing equipment had to be such as was available. It consisted essentially of (a) a gas-fired kettle

Continued on next page

and cooling floor; (b) a conventional kettle and filling arrangements.

The stearate was made into a slurry in a trough fitted with circulating pump, air blowing and steam coil and was then pumped to the reaction vessel. This was a spare hot neck grease kettle, brick mounted, fully enclosed and with glass manhole and observation ports. Heating was by multiple bunsen-type burners, the gas supply being barostatically controlled. The great danger was fire risk and this was minimized by an ingenious automatic arrangement whereby combustion gas was fan driven through a condenser into the top of the kettle and extracted by natural draught.

A batch of 4,000 lbs. required 2¼ hours to finish at 410°F, and was then discharged through a fire wall and via a distributing chute onto the floor of an enclosed building. The cooling floor, of Welsh blue brick set in alumina cement, accommodated a full charge to minimum depth of 1.2 inches. This could be varied by means of adjustable boundaries.

After overnight cooling the grease was conveyed to the conventional kettle, worked to correct penetration and filtered directly to containers.

No trouble was experienced in use with any of this grease of which some one million pounds were made.

(c) General

To refer in detail to the difficulties encountered with individual grease types may be supererogatory, but it may be mentioned that shortage of latex and polymers combined with variation in the nature of the stearates rendered standardization of aluminum greases difficult. Manufacture of such products for the lubrication of aircraft variable pitch propellers especially was a continuous headache, and also involved the development of special flow tests. These variable pitch propellers, I would remind you, only came into production during the Battle of Britain and their importance in the Spitfire cannot be over-stated.

In the absence of suitable waxes the composition of paper mill greases had to be revamped, but the substitutes continually gave glazing and carbonizing trouble.

Occasional complete absence of rosin and rosin oil made a number of grades unsatisfactory and it is also of interest

in this connection that only three grades of bitumen were available. As a result many of the older types of roll-neck greases were apt to be below standard.

In general, however, specialty greases gave the least trouble, perhaps because there were fewer specifications attached to them, and the highest possible standards were set by the makers themselves.

In conclusion the author showed some pictures of the bomb destruction referred to and of the reconstructed emergency plant.

Small Business Opportunities Seen in Transportation Field

Many opportunities exist in the motor trucking field for establishing small business enterprises, according to a Commerce Department booklet, "Establishing and Operating a Trucking Business."

The booklet traces the growth of motor transportation, noting increase in truck registrations from 10,000 in 1910 to almost five million in 1945, and credits the petroleum industry's constant improvements in quality of gasoline as a major factor in the rapid expansion.

Copies of the booklet, at 20c each, can be obtained from any of the department's field offices or from Superintendent of Documents, Washington 25, D. C.

New Treatise on Ball Bearing Lubrication

The New Departure Division of General Motors Corporation at Bristol, Connecticut, has just issued a booklet entitled, "Enclosure and Lubrication."

The two subjects are closely allied since in ball bearing installations a certain type of oil or grease may be indicated in order to meet anticipated or existing operating conditions which, in turn, dictates the type of enclosure required to furnish adequate protection against dirt and comply with other requirements of the installation.

On the other hand, conditions may definitely indicate a need of a certain type of seal or closure which, in turn, may greatly influence the selection of the kind and type of lubricant to be employed.

This booklet may be obtained gratis from the Advertising Department of the company upon request.

President Hobart Appoints N.L.G.I. Committees for the Year

In setting up the Institute's organization for the year, President H. P. Hobart has made the following committee assignments:

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Mr. B. C. Voshell, Chairman Socony Vacuum Oil Co., Inc. 26 Broadway New York 4, N. Y.	Mr. J. R. Battenfeld Battenfeld Grease and Oil Corp. 32nd and Roanoke Rd. Kansas City, Mo.

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